



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/659,748

09/11/2003

Manabu Nakamura

031140

3468

38834

7590

03/22/2005

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER

SMITH, BRADLEY

ART UNIT

PAPER NUMBER

2891

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/659,748

Applicant(s)

NAKAMURA ET AL.

Examiner

Bradley K. Smith

Art Unit

2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6,8-10,12,14-16 is/are rejected.
- 7) ☒ Claim(s) 7,11,17 and 18 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: search notes.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.
3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 4, 6, 8, 9, 12, 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Misium et al. (US Patent 6,261,973) in view of Wong (US Patent 5,423,944). Misium et al. disclose forming a first insulation film on the surface of

Art Unit: 2829

the substrate then forming a second dielectric film by low temperature processing. With regards to claims 2 and 4, the second dielectric film is formed via plasma nitridation (see title). With regards to claims 9 and 16, Misium et al. disclose performing the plasma nitridation below 650 degrees C (see column 2 lines 35-40). However Misium fails to disclose the formation of the first dielectric layer by using a strong acid. Whereas Wong disclose forming the oxide via acidic solution. With regards to claims 6 and 12, Misium disclose the use of nitric acid (see column 1 lines 20-25). With regards to claim 8 and 14, Misium disclose the use of ozone in an acidic solution (see column 2 lines 50-65). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Misium and Wong because the oxidizing agents such as nitric acid help remove defects (see Wong column 1 lines 20-25).

6. Claims 1, 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent 5,423,944) in view of Dobuzinsky et al (US Patent 5,412,246). Wong disclose forming a first insulation film using a strong acid solution on the face of the substrate. However Wong fails to disclose forming a second insulation film by low temperature processing. Whereas Dobuzinsky et al. disclose the formation of a second dielectric layer using low temperature processing. With regards to claim 3, Dobuzinsky et al. disclose using a low temperature oxidation plasma(see title) . With regards to claim 5, Dobuzinsky et al. disclose forming an ONO film (see column lines 55-65). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wong and Dobuzinsky et al in view of

Art Unit: 2829

because the oxidizing agents such as nitric acid help remove defects (see Wong column 1 lines 20-25).

7. Claims 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent 5,423,944) in view of Dobuzinsky et al (US Patent 5,412,246). as applied to claim 3 above, and further in view of Misium et al. (US Patent 6,261,973). Wong and Dobuzinsky et al disclose the forming of two insulation layers. However they fail to teach the use of nitric acid and an ozone containing solution (see above).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wong and Dobuzinsky et al ~~in view of~~ Misium et al. because the oxidizing agents such as nitric acid help remove defects (see Wong column 1 lines 20-25).

BKS
3/21/05

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Misium et al. (US Patent 6,261,973) in view of Wong (US Patent 5,423,944). Misium et al. and Wong et al. discloses the claimed invention except for the first insulation film has a film thickness of 1nm or more. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make an oxide film great than one nanometer, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art.

Art Unit: 2829

In re Aller, 105 USPQ 233, furthermore if the dielectric film were less than one nanometer it would lose its dielectric properties.

Allowable Subject Matter

9. Claims 7, 11, 18 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record neither teaches nor suggests heating the nitric acid above 70 deg C (claim 7) forming a gate insulation film or a tunnel insulation film (claims 11, 18, and 19).

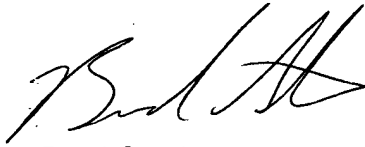
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bradley K. Smith whose telephone number is (571) 272-1884. The examiner can normally be reached on 10-6 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2829

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Brad Smith', is positioned above the printed name.

Brad Smith
Primary Examiner
Art Unit 2829